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ABSTRACT

Guidelines for improving the quality of school facilities in the United States are presented in this document. A national survey conducted by the Educational Research Service of 2,418 elementary and secondary administrators yielded 922 usable responses, which indicated that one building in every eight is an inadequate place for learning. Based on the belief that the condition of school facilities has a direct and lasting effect on educational quality, the American Association of School Administrators (AASA) held a conference to examine issues brought out by the study. Sections discuss each of the following issues and offer recommendations for improvement in the areas of: the learning environment; the age and condition of America's schools; maintenance; indoor air quality; energy efficiency; school finance; and leadership. Twelve tables, a glossary, a list of conference participants, and a school facility evaluation form are included. (10 references) (LMI)

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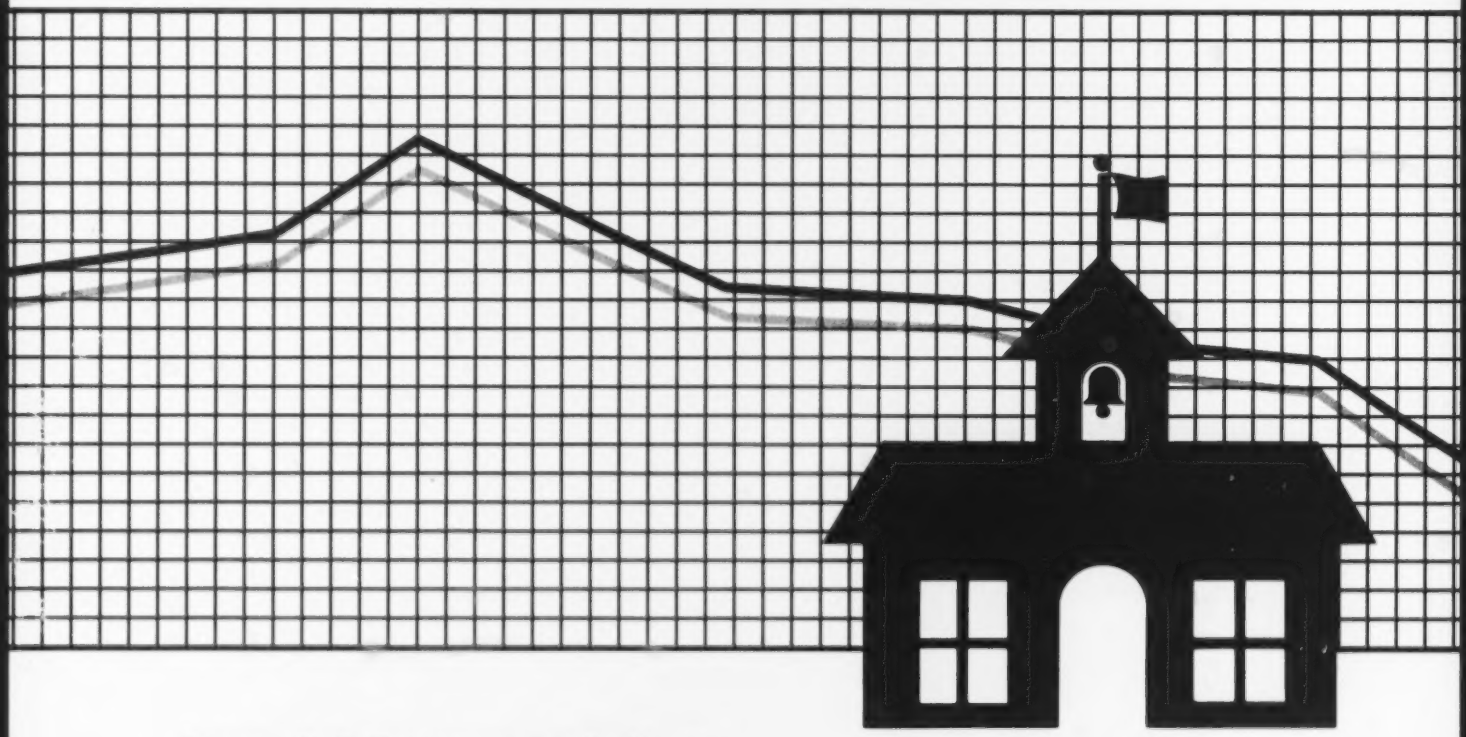
SCHOOLHOUSE IN THE RED

A Guidebook for Cutting Our Losses



Powerful Recommendations for Improving America's School Facilities

EA 024155

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SCHOOLHOUSE IN THE RED

A Guidebook for Cutting Our Losses

Powerful Recommendations for Improving America's School Facilities

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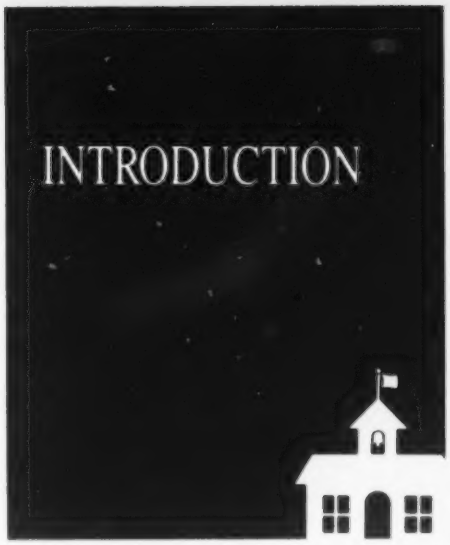
INTRODUCTION



Amid the signs that our nation's education "infrastructure" is crumbling, none is more alarming than the appalling condition of our nation's public school facilities. Our laws demand that children go to school. But is it humane that these laws require children to spend time in buildings that are unsafe and harmful to their health? Still, nearly 5 million children are subjected to substandard schools every day.

Much has been said about the need to restructure education across the nation. Very little has been said about the structures in which this restructuring is to take place.

The connection between academic achievement and the condition of school buildings is becoming clearer each day. That's why the American Association of School Administrators (AASA) determined that an assessment of the nation's educational facilities was urgently needed.

The AASA *Schoolhouse in the Re* project, funded by Honeywell, compiled all the known data on the nation's public school facilities, school energy and environment concerns, and education finance. These organizations then commissioned the first nation-wide survey of school facilities in over 30 years.*

The survey found that most of our nation's school buildings are living on borrowed time. Of even greater concern, the survey revealed that one building in every eight, or 13,200 schools across our nation, are inadequate places for learning. These findings were published in the Schoolhouse in the Red: Management Summary.

Reflecting on the data provided by the AASA study, an editorial in the *Corpus Christi Caller-Times* noted:

> *. . .Granted, in hard economic times. . .glamorless infrastructure concerns get relatively little attention, but this particular issue is one that Americans can ignore only at their peril — and their children's.*

LAYING THE GROUNDWORK

In January 1992, many of our nation's educational leaders and those concerned with indoor air quality and energy efficiency in schools met, at the request of AASA, to examine these issues. Those attending the conference are listed on the inside back cover. The recommendations growing out of this conference add an immediacy to the information compiled in the study. The call to action on these recommendations may at times seem subtle, but, the need to act is imperative.

The public schools are the only sector of the economy that cannot automatically pay higher energy costs by charging more for goods or services. Therefore, the AASA study also sought to assess the impact volatile energy prices have on our schools, what the schools have done to contain these costs, and what opportunities remain to cut school operating costs.

* The survey was conducted by the Educational Research Service using a random sample from all the nation's school districts. The response from the random sample of 2,418 elementary and secondary school administrators yielded a confidence level of 95 percent, with a margin of error of ±3 percent.

Information uncovered by this study will be vital to the decisions that communities, and educators in those communities, must make as our nation strives for greater educational promise for America's youth.

As the *Schoolhouse in the Red* data were compiled and analyzed, issues emerged. Clearly, the study revealed that the age and condition of America's schools and the impact on the learning environment are paramount concerns. Other issues include:

- concerns related to indoor air quality.
- the state and local governments' ability to meet facility needs.
- the status of the schools' energy efficiency efforts.
- existing opportunities to cut school operational costs.
- the serious void in federal and state governments' leadership to help our schools and communities deal with these vital issues.

Beginning on page 5 is a thorough examination of each issue accompanied by a series of powerful recommendations. On page 31 is a school facility evaluation form, which can serve as a guide to community leaders as they take action to improve their school facilities. The checklist items might also serve as the first step in a discussion of local needs.

MORE HANDS NEEDED

Schoolhouse in the Red should prompt a clarion call to every school district, every community in the nation, to look at their school buildings and judge their worthiness to house our young people. If the results of this study cause communities across the nation to take an objective look at the real conditions that ultimately affect our children and to act on those findings, the impact on the learning environment —and on learning— will be profound.

ISSUE 1.
THE LEARNING ENVIRONMENT

The age and condition of America's public school facilities is a matter of grave concern. Nearly five million American public school students are attending classes in substandard buildings. These children are required by law to enter schools that are structurally unsound, environmentally unsafe or, as described by the Education Writers Association, "shoddy places for learning."

Classroom conditions affect student achievement. As research begins to quantify what has been empirically assumed, the demand for a quality learning environment will grow. Problems related to old, inadequate buildings, deferred maintenance and indoor air quality will become even more crucial.

THE CHALLENGE

A healthy, safe, and adequate learning environment should be every child's right. The immense challenge before us is making the American people more aware that the condition of our school facilities has a *direct and lasting* effect on the quality of education for students. We must convince those in a position to help that the quality of the learning environment is an essential part of education.

Also, if the United States wants to stay competitive globally, we need to provide a first class learning environment for every student.

We ought not to expect kids to learn in an environment we ourselves would not tolerate.

Gordon Cawelti
Executive Director
Association of Supervision and Curriculum Development

BACKGROUND DATA

The quality of the learning environment sends its own message to students. In its 1988 report, "An Imperiled Generation: Saving Urban Schools," the Carnegie Foundation for the Advancement of Teaching forcefully brought this point home, stating:

> *. . . the tacit message of the physical indignities in many urban schools is not lost on students. It bespeaks neglect, and students' conduct seems simply an extension of the physical environment that surrounds them.*

Leaking roofs, ceilings and walls with significant water damage, crumbling plaster, electrical systems that did not work, and heating systems whose controls did not function were recently cited by the Washington, D.C., Committee on Public Education. The committee said the message these buildings were sending to students was:

> *. . .what is going on inside is not important, that the school system is uncaring, and that neglect is tolerated. A building in poor repair contributes to the attitude and discipline problems among students, which in turn contributes to poor performance in schools [underscore supplied].*

We need a national effort to highlight the conditions and relationship between good facilities and student performance.

Jeremiah Floyd
Associate Executive Director
National School Boards Association

In her research at Georgetown University, Maureen Edwards compared average achievement scores to building conditions of the Washington, D.C., schools in 1991. Working with the actual standardized achievement scores depicted in Figure 1 and statistically removing other variables, such as the student's socioeconomic status, she found the following:

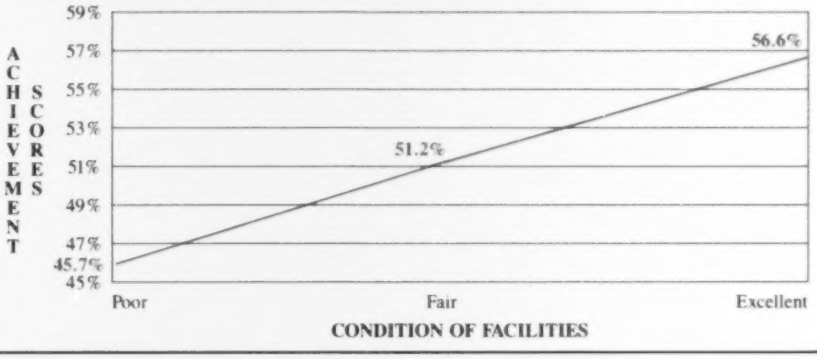
- Students assigned to schools in poor condition can be expected to fall 5.5 percentage points below those in schools in fair condition.
- Students assigned to schools in poor condition can be expected to fall 11 percentage points below those in buildings in excellent condition.

Edwards concluded, "Good infrastructure is truly at the base of a quality education."

RECOMMENDATIONS

- **Educators, parents, and their communities should make the learning environment in their schools a top priority.**
- **School leaders should join with architects, planners, parents, and others to develop a school facility appraisal guide to help in judging the condition of local schools.**

FIGURE 1
PREDICTED ACHIEVEMENT SCORES AND BUILDING CONDITION



THE STUDENTS RESPOND

Students know the difference . . . and care. If given more education dollars, the first place America's high school students would invest the money is in improved maintenance and construction, according to a poll of 72,000 teenagers by *USA Today* in the summer of 1991.

THE CHALLENGE

Three-fourths of the school buildings in use today are living on borrowed time; they have outlived their predicted useful life. Twelve percent, or 1 building in 8, are inadequate places for learning. For five million children, school is "no place to learn."

As a nation, our school facilities are not keeping pace with growing expectations for American education. As we reshape education in America, we must also reshape our school facilities. Schools should be built for productivity. Every school building must be efficient, flexible, and functional enough to serve the changing dynamics of American education.

Equity issues are often directly reflected in the condition of school facilities—and those structural inequities can persist through the entire life of a school building.

ISSUE 2.

AGE AND CONDITION OF AMERICA'S SCHOOLS

If national goals for student performance are to be met, our students must have learning environments that support high productivity. Investments in high-tech plants and overcoming the neglect of maintenance is essential for a genuine 21st century opportunity to learn for every student in America.

Gordon Ambach
Executive Director
Council of Chief State School Officers

1 in 8 school buildings termed 'inadequate for educating' kids

By Bob Dart
Tribune/Cox News Service

WASHINGTON — Too many American children are trying to learn reading, writing and arithmetic in rooms that should be razed or repaired, a national survey of school officials showed Tuesday.

The survey, funded by Honeywell Inc., queried 1 million public school officials in buildings that are unsound or environmentally unsafe. At least one in every eight of those buildings is "not adequate for educating children."

One-third of the nation's schools were built before World War II — making them at least 40 years old — while only 11 percent were constructed since 1980, the survey showed.

In the report's regional breakdown, the West had the greatest percentage of new school buildings — 30 percent constructed since 1970. In the West, 20 percent of the schoolbuildings had been built before World War II.

School administrators in the West classified 10 percent of their buildings as inadequate, the survey said.

"Our nation's school facilities, largely ignored in all national reports, are deteriorating," said Richard Miller, executive director of the American Association of School Administrators.

While classroom computers and well-paid, well-qualified teachers are important components of education, the physical environment makes it harder for children to learn and harder for teachers to teach."

In addition to buildings that are too old, the administrators cited problems in their schools ranging from overcrowding and structural defects to poor or non-existent heating and air conditioning and inadequate electrical and mechanical systems.

"More than half of the school administrators responding to our survey said their districts need new school construction," Miller said.

He acknowledged, however, that [illegible] caught in a financial [illegible] declining tax [illegible] educational

For 5 million pupils, schools are inadequate

By Tamara Henry
The Associated Press

WASHINGTON — It's tough to teach kids when they're too hot or too cold, or when they must study in dimly lit or structurally hazardous rooms, yet some 5 million American schoolchildren face these conditions daily.

A survey released Tuesday by the American Association of School Administrators said [illegible] 200 schools — one in eight — provide poor environments for learning.

"Too many of our school buildings are on the critical list," said Richard D. Miller, executive director of the association. "We as a [illegible] cannot live with the conditions because it seriously impairs the learning environment for millions of our young people."

The biggest problem [illegible] 49 percent of the [illegible] ress with building [illegible] age. That was especially [illegible] trators reported that [illegible] of the substandard [illegible] too old, the survey [illegible] About 31 percent [illegible] lem schools had [illegible] electrical or mech[illegible] terns and with hea[illegible] conditioning. Many [illegible] reas wrote in the [illegible] children were either [illegible] outdated or in poo[illegible] nonexistent.

"Imagine being an administrator in a situation where your staff and little children must by law enter a building each day that you know is structurally unsound," said Shirley Hansen, an authority in the field of energy management in non-profit institutions.

Hansen said some schools are environmentally unsafe. Asbestos, radon and a myriad of indoor air quality problems concern administrators, she added.

Nearly one-third of the nation's 110,000 public schools were built before World War II, the survey said, and many more were built in the 1950s and [illegible] and designed to last no more than 30 years.

The survey, described by the association as the first nationwide study of American public school buildings in nearly 30 years, was conducted by Educational Research Service as part of a larger study of the nation's school facilities, drawn from all [illegible] districts, has a margin of sampling error of plus or minus [illegible]

Survey Discovers

Old School Buildings Provide Poor Learning Environments

By TAMARA HENRY
Associated Press Education Writer

WASHINGTON — Nearly 5 million American public school students go to class in substandard buildings, with the most common problem being old age, a survey of school superintendents showed last week.

The survey released by the American Association of School Administrators found that 13,200 schools — one in eight — provide poor environments for learning.

The biggest problem, listed by 49 percent of the superintendents with building troubles, was age. Administrators in the Southeast reported 63 percent of the substandard schools were too old.

About 31 percent of the problem schools had troubles with electrical or mechanical systems and with heating and air conditioning. Many superintendents wrote in the survey that children were either too hot or too cold and that systems were outdated, or in poor shape or nonexistent.

"Imagine being an administrator in a situation where your staff and little children must by law enter a building each day that you know is structurally unsound," said Shirley Hansen, authority in the field of energy management in non-profit institutions.

Twenty-five percent of the substandard schools had a desperate need for roofing or window repairs, the administrators said. About 8 percent of the problem schools were said to be structurally unsound.

"Imagine being an administrator in a situation where your staff and little children must by law enter a building each day that you know is structurally unsound," said Shirley Hansen, an authority in the field of energy management in non-profit institutions.

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▶ EDUCATION

Administrators find school face lifts help to motivate

Students, community benefit when older school is renovated

By Pat Sommer
STAFF WRITER

The American Association of School Administrators survey of the nation's schools blames the high percentage of schools built before World War II or during the "'50s and '60s era of [illegible]

[illegible] hopes renovations and the recent addition of new buildings will increase participation of his students' parents in their PTO.

Norman Walker of U.B. Kinsey Elementary in West Palm Beach, built in 1917, says educators at coastal schools feel slighted as they watch brand-new, fully equipped schools go up in western suburbs. Parents of students at these schools have the time and resources that parents of his students, often working two and three jobs to get by, do not have.

But Walker is optimistic that proposed townhouses in the neighborhood will attract more affluent families, reverse declining enrollment and bring parental support. "Right now it's at a minimum, but it's better than in previous years.

Welcome inconvenience

Edward Harris, principal of Northboro Elementary in West Palm Beach, which was built in 1920, is dealing with the inconveniences of renovations. But it's an inconvenience he and his staff welcome.

"We're working under some adverse conditions," Harris said. "But if you have something new, you develop a sense of pride. It's bound to [illegible] teacher morale and student mo[illegible]

the mansions, staff and students [illegible] 800-student inner-city school [illegible] fearfully dodging construction. [illegible]'s goal: A school that is even [illegible] equipped and more attractive [illegible] suburban schools.□

Survey: 5 million children are in substandard schools

FROM STAFF AND WIRE REPORTS

WASHINGTON — Some 5 million American schoolchildren attend classes in substandard buildings, with problems ranging from severe overcrowding to poor heating and structural hazards, superintendents said Tuesday in a survey.

The national survey released by the American Association of School Administrators and 19,200 schools — one in eight — provide poor environments for learning.

Springfield's public school building is structurally sound, but several [illegible] the district has to [illegible]

Chubbuck, Illinois, 12 percent of the districts reported inadequate buildings.

Nationwide, about 31 percent of the problem schools had troubles with electrical or mechanical systems and with heating and air conditioning. Many superintendents wrote in the survey that children were either too hot or too cold and that systems were outdated or in poor shape — or non-existent.

Twenty-five percent of the substandard schools had a desperate need for roofing or window repairs. The administrators said. About 8 percent of the problem schools were said to be structurally unsound.

Nearly one-third of the nation's 110,000 public schools were built before World War II. The survey said, and many more were built in the [illegible] and designed to last [illegible]

Our shabby schools

More bad news in academia: Students are going to school this fall in crowded, decrepit buildings with clunky furnaces and cooling systems that don't exist or don't work.

"It seriously impairs the learning environment for millions of our young people," says Richard Miller, executive director of the American Association of School Administrators. He means you can't learn much if there's no heat and the lights keep going out.

A survey found that 13,200 school buildings are inadequate. The problem is acute in the big cities and the Southeastern states.

Nearly a third of the nation's 110,000 public schools were built before World War II. Many others were erected, often on the cheap, during the [illegible]

For millions of children, school is no place to learn

By TAMARA HENRY
ASSOCIATED PRESS

WASHINGTON — Some 5 million American schoolchildren attend classes in substandard buildings, with problems ranging from severe overcrowding to poor heating and structural hazards, superintendents said Tuesday in a survey.

The survey released by the American Association of School Administrators said 13,200 schools — one in eight — provide poor environments for learning.

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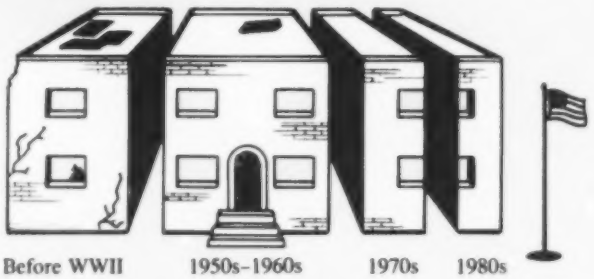
BACKGROUND DATA

Replacement of 74 percent of our nation's school buildings is long overdue:

- Thirty-one percent were built prior to World War II. While data were gathered by decades, "pre-World War II" is a common descriptor of architectural style.
- Forty-three percent were built during the 1950s-60s era of cheap, energy inefficient construction to meet baby boom needs. Often non-durable, they were not intended to last more than 30 years.

FIGURE 2
AGE OF THE NATION'S SCHOOL BUILDINGS



In Table 1, the decades in which school facilities are built are broken out by district size and geographical region of the country. As indicated in the table, small school districts and districts in the central states have the greatest percentage of old buildings and the least number of new buildings. (The states in each region are identified in the Survey and Analysis Procedures section.)

TABLE 1.
AGE OF SCHOOL FACILITIES; BY DISTRICT SIZE AND GEOGRAPHICAL REGION

		DISTRICT ENROLLMENT			REGION OF THE U.S.			
% Built:	Total Sample (Mean)	10,000 or More	1,000 to 9,999	Less Than 1,000	North East	South East	Central	West
Before 1950:	30	25*	25	33	29	21	32	29
1950–1959:	21	23	24	18	24	22	22	15
1960–1969:	22	23	22	21	24	21	24	19
1970–1979:	14	14	14	15	10	19	11	20
1980–Present:	11	13	12	10	12	14	8	15

*Reported in percentages calculated from raw data. Totals will not necessarily equal 100.

Not surprisingly, then, 12 percent of the nation's schools are not adequate places for learning, according to the 1991 AASA survey. Administrators responding to the survey self-defined what made their schools "inadequate." Their responses are shown in Table 2.

TABLE 2.
MAJOR PROBLEMS THAT CAUSE BUILDINGS TO BE INADEQUATE; BY PERCENT AVERAGES

		DISTRICT ENROLLMENT			REGION OF THE U.S.			
	Total Sample (Mean)	10,000 or More	1,000 to 9,999	Less Than 1,000	North East	South East	Central	West
Too Old	49.0	44.2	57.1	52.6	25.0	83.3	47.7	48.1
Too Small, Not Enough Space	19.8	12.1	21.2	18.4	41.7	16.7	18.2	14.8
Building Not Structurally Sound	8.3	17.6	15.2	10.5	—	8.3	4.5	18.5
Poorly Maintained	1.0	4.2	2.7	—	—	—	—	3.7
Heating or Air Conditioning Bad or Nonexistent	20.8	25.5	9.8	18.4	25.0	8.3	22.7	22.2
Electrical/Mechanical Systems Outdated/Poor Condition	9.4	15.8	8.2	7.9	25.0	—	11.4	3.7
Roof Repairs/Replacement	8.3	10.9	7.6	10.5	8.3	—	11.4	7.4
Insulation/Window Replacement	16.7	7.3	7.7	15.8	25.0	8.3	18.2	11.1
Asbestos	2.1	4.2	2.2	2.6	—	—	—	7.4
Renovation	3.1	4.8	3.8	—	—	25.0	—	—
Energy Inefficient	4.2	4.8	4.3	7.9	8.3	—	4.5	3.7

*Respondents were asked to mark all responses that applied; so columns exceed 100.

A more limited study conducted by the Education Writers Association in 1989 voiced similar concerns. Based on data obtained from 38 states covering approximately half the nation's school buildings, the EWA found:

- 25 percent of the nation's schools were inadequate. Of these:
  - 61 percent needed maintenance or major repairs;
  - 43 percent were obsolete;
  - 42 percent had environmental hazards
  - 25 percent were overcrowded; and
  - 13 percent were structurally unsound.

With all the problems we have related to providing quality facilities, we cannot fix everything at once. We need to do realistic, priority-based planning. Then we can develop a long-range plan to deal with the fiscal means of paying for all the school facility needs.

Len Nachman
President
National Association of State Directors of School Plant Services

RECOMMENDATIONS

- **A campaign should be launched to make key decision-makers in the federal agencies, congress, state departments of education, and at the local level aware of the alarming deterioration of America's school buildings and the implications for learning.**
- **America's education associations, architectural and engineering societies, state education agencies, and the private sector should combine forces to develop model components and guidelines for school facilities that are consistent with educational needs of the 21st century.**
- **The American people should demand that the quality of educational facilities and the learning environment for students not be limited by the wealth of a district.**

The View From Inside

The question has been raised, "What do we mean by poor facilities?" I can't speak for all the Southeastern states, but I can certainly speak for my district. We are defining a poor facility as one which is fifty years old where we are unable to use modern technology. As a matter of fact, you have to unplug one machine to plug another machine in. If we want to run the copier, we unplug a computer. We are trying to use technology and reform in education, but we can't use technology because the wiring is 50 years old. We have students that are attending class in classrooms of 100 degrees. On very hot days, we dismiss schools if it reaches a heat index of 100 degrees.

We are asking teachers and students to operate in environments that we ourselves would not shop in in our shopping malls, we would not sit in to see a movie in theatres, and we ourselves would not seek to work in on a daily basis for the majority of a year. So, that is what I would describe as a poor facility.

Now, the question of funding has also been raised. Let me describe for you the type of funding on which our school system has operated. In 1950, we received $25 a pupil for building purposes, in 1992 we recovered $30 a pupil for building purposes, and we all know what has happened between the 1950s and 1990s. It has been absolutely impossible to do the required maintenance on buildings. In some buildings, we have buckets that catch rainwater.

A complicating factor has been the increased cost for asbestos removal. In the last eight months, we have spent $1.2 million in the removal of asbestos just to allow us to renovate school buildings in our district.

So with the funding of $30 a pupil from the state, the increased costs in asbestos requirements (and that is only one of the requirements we have had to meet), with reductions in funding, zero percent raise for teachers, reductions in the dollars in the general fund for operating the school system, it is a very serious problem.

That is one scenario of a Southeastern school district that is grappling with the problems of providing adequate school buildings for adequate instructional programs for children, and for the kind of professional environment the teachers and our staff members deserve.

Comments offered at the Schoolhouse in the Red Conference
by **Karen Woodward**, Superintendent
Anderson School District 5, Anderson, South Carolina

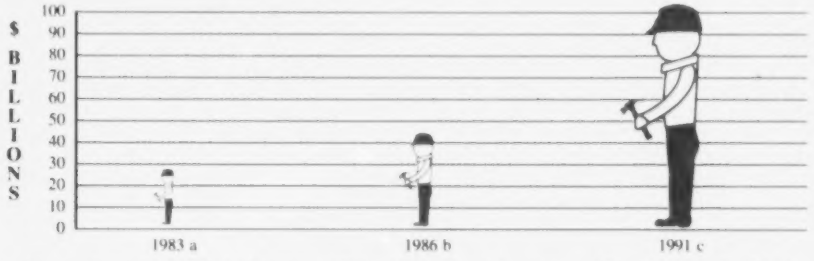
THE CHALLENGE

As the maintenance in our nation's public schools becomes progressively worse:

- Equipment breaks down.
- Indoor air problems multiply.
- Buildings fall into greater disrepair.
- The learning environment deteriorates.

On one hand, administrators today are faced with more old school buildings, which require additional maintenance; and, on the other hand, they have smaller maintenance budgets to provide critical upkeep. The price tag for deferred maintenance has quadrupled in just eight years, from $25 billion to $100 billion. A costly proposition in and of itself; deferred maintenance spawns other costs as it speeds up the deterioration of buildings and the need to replace equipment.

FIGURE 3.
DEFERRED MAINTENANCE PRICE TAG



a. American Association of School Administrators, National School Boards Association and Council fo Great City Schools
b. Education Writers of America, *Wolves at the Schoolhouse Door*
c. Association of School Business Officers, *School Business Affairs*

BACKGROUND DATA:

1983 "...The data clearly show that schools throughout the nation, particularly those in the older inner cities, have deferred **$25 billion** dollars of repairs. The bill for postponing this maintenance has come due and will only increase in time."

The Maintenance Gap
American Association of School Administrators
National School Boards Association
Council of Great City Schools

1989 "States estimate that today the education infrastructure needs an investment of...**$41 billion** for maintenance and repairs."

Wolves at the Schoolhouse Door
Education Writers Association

1991 "...school administrators must find viable solutions to the vexing operational issues of the 1990s....The growing volume of deferred maintenance (estimated at over **$100 billion**) which threatens the capital investment in schools..."

Larry C. Fenster
School Business Affairs, July 1991

ISSUE 3.

MAINTENANCE—GOING DEEPER IN THE RED

Deferring action on school facility maintenance allows community assets (school buildings) to be damaged, costing taxpayers more in the long run. Preventive maintenance programs are cost effective, justifiable, and necessary.

Tony Wall
Executive Director
Council of Educational Facility
Planners International

RECOMMENDATIONS:

- **The message must be communicated loud and clear that deferring maintenance today can lead to structural and environmental problems that can hurt children tomorrow.**
- **Decision-makers at all levels may need to look beyond traditional funding sources if the crushing burden of deferred maintenance is to be lifted. Energy saving projects might free funds to serve this crucial need.**
- **It should be clear to local decision-makers that routine maintenance is a sound investment that will lead to reduced equipment problems and replacement, greater facility longevity of the school buildings, and healthier students and staff.**

ISSUE 4.

INDOOR AIR QUALITY

The very real fears and concerns for children's health as well as the health of teachers and staff should be enough to prompt preventive strategies. Inadequate maintenance is a leading cause of indoor air problems. It is impossible to ensure quality indoor air without a quality maintenance program.

Shirley J. Hansen
President, Hansen Associates
Facility Consultant to AASA

THE CHALLENGE

The incidence of indoor air quality (IAQ) problems in the schools is directly related to poor maintenance. The potential for indoor air problems in schools should be a matter of growing concern to all Americans.

Schools can be energy efficient and still have quality indoor air. Adequate ventilation is an important consideration, but removal or containment of the pollution source is preferred. Some problems could be avoided through IAQ-conscious design.

BACKGROUND DATA

The quality of indoor air in America's classrooms is a matter of increasing concern to school administrators across the country. Reports include:

- headaches, nausea, growing absenteeism, and the eventual closing of a Pennsylvania elementary school in 1991 due to a solvent used in the removal of floor tiles.
- the closing of new schools from New Hampshire to California due to indoor air problems.
- frightened, worried, angry parents filing lawsuits against firms, whose products and services had been used in renovation and new school construction, as indoor air problems have emerged.

As the list grows, so do the apprehensions throughout the educational community. School districts are, however, becoming attuned to indoor air quality problems, and solutions do exist.

Old and Moldy

When teachers and students started showing protracted flu-like symptoms in Kettle Falls, Washington, in 1990-91, school officials obtained the services of the state toxicologist.

Diagnosis determined a mold in the wall was at fault. Damp, moldy wall-board, which had been out of sight behind a caulked seam, was removed. It was quickly corrected, and so were the related health problems.

Why School Buildings Get "Sick"

"Sick" school buildings are the result of gases and/or particles in the air, which can cause illnesses ranging from eye irritations, headaches, mild respiratory problems to death. Sources of these pollutants vary widely; most can be removed or encapsulated. The leading organizations in IAQ investigations; i.e., the National Institute of Occupational Safety and Health (NIOSH), Honeywell, and the Healthy Buildings Institute (HBI), have listed the primary sources they've discovered in Table 3.

TABLE 3.
SICK BUILDING SYNDROME PROBLEMS

Organization	NIOSH	HONEYWELL	HBI
Buildings	529	50	223
Year	1987	1989	1989
	Inadequate ventilation (52%) Inside contamination (17%) Outside contamination (11%) Microbiological contamination (5%) Building fabric contamination (3%)	Operations & Maintenance (75%) ☐ energy management ☐ maintenance ☐ changed loads Design ☐ ventilation/ distribution (75%) ☐ filtration (65%) ☐ accessibility/ drainage (60%) Contaminants (60%) ☐ chemical ☐ thermal ☐ biological	Poor ventilation ☐ no fresh air (35%) ☐ inadequate fresh air (64%) ☐ distribution (46%) Poor filtration ☐ low filter efficiency (57%) ☐ poor design (44%) ☐ poor installation (13%) Contaminated systems ☐ excessively dirty duct work (38%) ☐ condensate trays (63%) ☐ humidifiers (16%)

Source: *Managing Indoor Air Quality*, The Fairmont Press

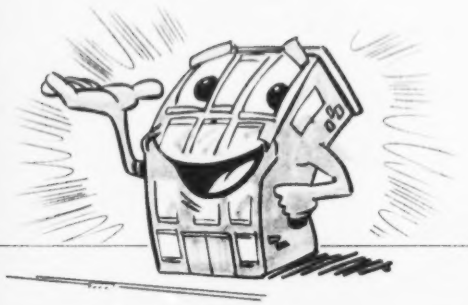
Legal Worries and "Pollution Exclusion"

Uncertainties and the absence of clear medical and scientific guidelines for many contaminants have created a field ripe for lawsuits.

The architect and engineer design profession was warned several years ago by a prominent California insurance broker in his newsletter, *The Professional Liability Perspective*:

> *The potential liability problems posed by indoor pollution are compounded by the fact that the pollution exclusion in your policy of professional liability insurance is all-encompassing. It extends to every form of environmental contamination imaginable. The risk is simply not insurable. [underscore supplied]*

The insurance coverage school administrators rely on for liability protection specifically excludes any pollution problem. At present, compliance with ASHRAE 62-1989 (see sidebar) is generally the best legal defense school administrators have.



ASHRAE 62-1989 "Ventilation for Acceptable Indoor Air Quality"

The American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) standard 62-1989, has the net effect of increasing outside air from 5 cubic feet per minute (cfm) per person to 15 cfm/person in the classroom and 20 cfm/person in the office.

Compliance with ASHRAE 62-1989 will increase energy consumption in the schools an average of 20 percent, according to a U.S. Department of Energy sponsored study. Alternative control procedures using CO_2 sensors and off-setting energy efficiency technologies are imminent or on the shelf, if only schools were to receive appropriate guidance to make use of them.

Causes and Controls

When NIOSH reported that 52 percent of the indoor air quality (IAQ) problems were due to "inadequate ventilation," many inaccurately interpreted it as insufficient outside air. Instead, NIOSH's definition of inadequate ventilation included:

- inadequate ventilation (outside air);
- poor air distribution;
- temperature and humidity complaints;
- improper or no heating, ventilating, or air conditioning maintenance; and
- inappropriate energy conservation measures.

The misinterpretation of the NIOSH findings and the repeated claims in the press that IAQ is the result of energy efficient buildings has lead to over-reliance on ventilation as the cause and the cure.

We need to do a much better job of helping people learn how the reduction of maintenance directly affects those who spend time in the facility. If the head of the largest corporation in town would not choose to work in conditions found at the local school, then we need to think twice before sending our children — who are tomorrow's CEOs.

Jewell Gould
Director of Research
American Federation of Teachers

RECOMMENDATIONS

- **Schools and communities must realize that deferred maintenance can lead directly to poor indoor air quality, which in turn may lead to lost productivity, absenteeism, and greater difficulty in teaching and learning.**
- **Federal and state leaders working with local educators should give high priority to developing guidelines for ensuring adequate indoor air quality. Environmental mandates, however, should be held to a minimum and, when issued, should be accompanied by the funds necessary to implement them.**
- **Professionals who design schools should seek additional ways to incorporate preventive IAQ strategies in design work.**
- **Associations, states, and organizations concerned about indoor air quality should develop and/or sponsor seminars to train educators how to effectively perform "walk-through" IAQ inspections and to manage IAQ concerns.**

ISSUE 5.

ENERGY EFFICIENCY: HIGH POTENTIAL, LOW PRIORITY

I can't stress enough that energy conservation within the school must be a team effort.

Michael D. McCormick
Manager, Community Relations
Philadelphia Electric Company

THE CHALLENGE

Maintenance is frequently sacrificed to pay utility bills. School leaders need to gain a better understanding of the way energy cost-saving measures can bolster maintenance and improve the learning environment.

Anything that reduces costs for non-instructional requirements of school operations, such as expenditures for energy, can free up resources for instruction.

Government and private sector expertise and financial support are available to schools that wish to reduce energy consumption. However, ways to help school administrators more effectively access this support must be found. Through more efficient operations, schools can redirect nearly two billion taxpayer dollars that go up the smokestack each year in wasted energy into programs and services for students.

BACKGROUND DATA

School energy costs continue to climb. In the two-year period between 1989-91, the utility bill for the nation's public schools went up 18 percent. It reached an all-time high of $7.4 billion for the 1991-92 school year.

The Potential To Save

Opportunities to cut school operating costs are significant:

- School districts initiating an energy program can typically cut energy consumption by 25 percent through energy efficient operations, prompt maintenance, and building/equipment measures with a three-year payback or less.
- A 25 percent reduction would mean that at least $1.85 billion per year, now paying for unnecessary energy, could be spent in the nation's classrooms, once the capital costs were recovered.
- $1.85 billion is nearly one-sixth of the money spent by the federal government each year for the nation's public schools.

Investing in energy efficiency in the schools to achieve such savings would also lead to:

- improved maintenance;
- improved indoor air quality, comfort, and learning environment;
- reduced fossil fuel consumption and emissions into the air;
- more dollars infused into the economy, including $2 billion into the purchase of retrofit materials and equipment and $3 billion into the labor market, particularly the hard-pressed construction industry; and
- approximately $40 per student per year to provide needed educational programs and services to boys and girls.

Low Priorities

Despite the obvious benefit of reducing operational costs during times of tight revenues, fewer than half the nation's public schools said that they have an effective energy program. The perceived status of the nation's school energy programs is shown in Table 4.

TABLE 4.
SCHOOL DISTRICT ENERGY EFFICIENCY PROGRAM STATUS (BY PERCENT GIVING RESPONSE)

Perceived Status of Program	Total Sample (Mean)	DISTRICT ENROLLMENT			REGION OF THE U.S.			
		10,000 or More	1,000 to 9,999	Less Than 1,000	North East	South East	Central	West
None in District	13.9	0.9	8.9	22.7	9.3	12.0	13.1	20.6
Just Getting Started	30.5	25.1	27.6	35.9	27.8	36.0	27.9	34.9
In Place and Effective	46.2	66.6	53.1	35.2	53.7	44.0	50.0	33.3
In Place but Ineffective	6.4	6.5	8.2	3.9	5.6	8.0	4.9	9.5
No Personal Knowledge of Program	1.1	—	0.9	1.6	1.9	—	0.8	1.6
No Response	1.9	0.9	1.4	0.8	1.9	—	3.3	—

The extent to which audits have been conducted suggests the degree to which school districts have undertaken a comprehensive energy program. Table 5 on page 17 reveals that 64 percent of all districts have conducted audits; 84 percent of the large districts have conducted audits; and approximately three-fourths of the districts in the southeast and central states have conducted audits. Lack of comprehensive energy programs seems to be centered in small districts and in the western and northeastern states.

Audit activity within the district is also an indicator of energy program penetration. For example, 84 percent of the large districts have conducted audits, but 19 percent have performed audits on fewer than one-third of their buildings.

TABLE 5.
PERCENTAGE OF DISTRICTS THAT HAVE CONDUCTED AUDITS; PERCENT OF SQUARE FOOTAGE AUDITED*

		DISTRICT ENROLLMENT			REGION OF THE U.S.			
	Total Sample (Mean)	10,000 or More	1,000 to 9,999	Less Than 1,000	North East	South East	Central	West
Yes, Audits Conducted	63.9	83.9	71.3	53.1	51.9	76.0	72.1	54.0
Percentage Audited:								
Less Than 10 Percent	—	5.9	0.3	—	—	—	—	—
10 to 19 Percent	2.9	8.9	3.2	—	—	5.3	2.3	5.9
20 to 29 Percent	2.9	10.3	5.4	1.5	3.6	5.3	2.3	2.9
70 to 79 Percent	3.5	5.2	4.8	2.9	7.1	—	2.3	5.9
80 to 89 Percent	7.1	6.6	7.0	2.9	14.3	5.3	4.5	8.8
90 Percent or More	62.9	37.3	54.6	75.0	57.1	57.9	70.5	50.0
No Audits Conducted	34.6	14.2	27.3	45.3	48.1	20.0	26.2	44.4

*Significant numbers fell in the lower and upper percentages. Double line indicates break in data.

Changes in technology, energy prices, and building operations can cause an audit to go out of date rather quickly. At the time this report was published, 35 percent of the country's school systems had audits more than five years old. Roughly half the districts in the east have audits more than four years old.

Barriers and Motivators

Why have so many districts done so little? Unfortunately, other aspects of school operations are frequently more demanding or of greater consequence; e.g., personnel that normally would have performed energy efficiency work have been required by federal mandates to address such issues as asbestos.

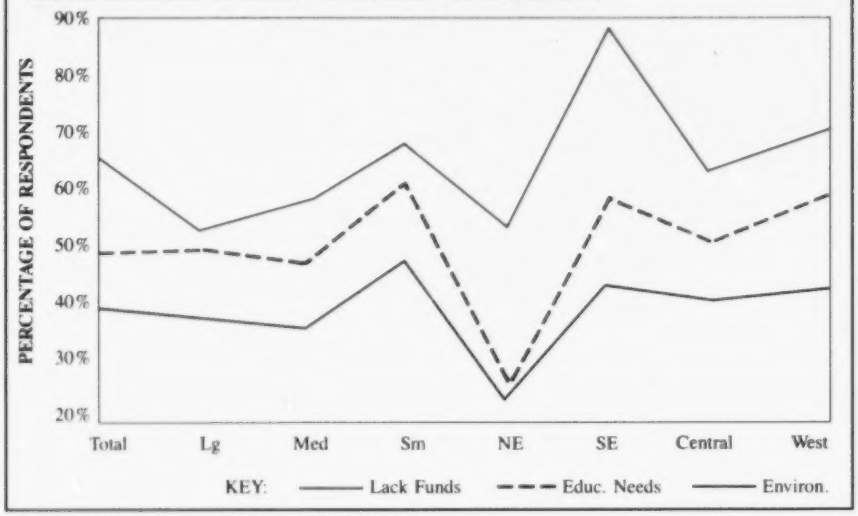
The major barrier to greater energy efficiency is money. From all corners of the nation, no matter what the district size, factors that inhibit energy work in descending order are:

- general lack of funds
- financial needs for educational programs
- the money required to meet environmental mandates.

Figure 4 displays the consistency with which all districts and geographical regions identified the major factors that detract or inhibit energy efficiency improvements.

FIGURE 4.

MAJOR BARRIERS TO ENERGY EFFICIENCY IMPROVEMENTS



So what motivates school administrators to do energy work? The survey reveals that over half of the school people are motivated to take energy action by:

- high or unstable energy prices (61 percent)
- need to cut operational costs to meet educational needs (59 percent)
- availability of outside funds (34 percent)
- changes in utility rate schedules (33 percent).

Understanding Energy Efficiency Opportunities

Structural needs, poor technical advice, and limited knowledge of energy efficiency procedures have led schools to use the greatest percentage of federal grant funds for building envelope work. As shown in Table 6, the most recent U.S. Department of Energy (DOE) analysis of funded energy conservation measures, building envelope work is the least cost-effective energy conservation measure.

An analysis of the U.S. DOE data reveals:

- Thirty-three percent more was spent on envelope measures than on controls.
- Controls, however, saved three times as much as work on the building envelope (the building enclosure including ceilings, walls, windows, and floors).
- Dollar for dollar, the payback from controls was more than four times as great as the envelope payback.

The need to replace roofs and windows probably prompted some of the emphasis on building envelope work; however, most administrators believe envelope work to be far more cost-effective than it is. (See discussion under Issue 8, Leadership and Guidance.)

TABLE 6.
EFFECTIVENESS OF ENERGY CONSERVATION MEASURES IN SCHOOLS

ECM Category	Number of Measures[1]	Total Cost[1] ($10⁶) 106	Annual Savings Energy[1] (10^{12} Btu) (1012)	Annual Savings Cost[1] ($10⁶) 106	Payback (years)
Controls	9,079	$96.4	7.4	$47.6	2.0
Ventilation	4,138	25.4	1.3	6.5	3.9
Heating	5,261	56.9	2.6	15.6	3.6
HVAC[2]	356	6.2	0.2	1.4	4.4
Cooling	364	9.1	0.4	1.9	4.8
Lighting	7,566	41.5	1.6	10.2	4.1
Envelope	10,481	129.4	2.5	14.8	8.7
Other	1,726	38.8	1.0	7.4	5.2

[1] Institutional Conservation Program ECM grant cycles I through VIII

[2] Heating, ventilating, and air conditioning

Source: Argonne National Laboratory, U.S. DOE

The Vicious Circle

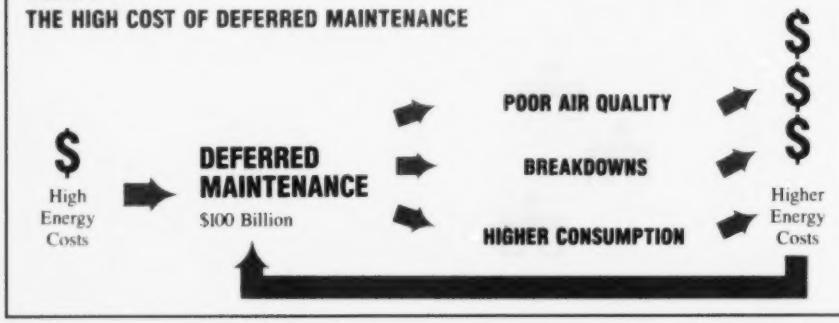
As shown in Figure 5, the nation's schools are caught in a vicious circle prompted by higher energy prices. When utility bills exceed the budgeted amount, the source of funds for 40 percent of the nation's districts is the maintenance budget. This pattern, of course, defers even more maintenance due to a lack of funds.

To defer, or put off intentionally and habitually, needed maintenance ultimately:

- requires more parts and labor as well as earlier replacement of equipment
- leads to premature building deterioration
- prompts more indoor air problems
- means less efficient operation of the equipment.

Ironically, less efficient operation causes higher energy consumption. Higher consumption, in turn, means higher utility bills and the vicious circle starts all over again.

FIGURE 5.
THE HIGH COST OF DEFERRED MAINTENANCE



RECOMMENDATIONS:

- **Rising energy costs, coupled with the availability of energy conserving technology, should make energy efficiency a high priority for every school system in America.**
- **Educators should view energy cost savings as an opportunity to serve students' educational needs and to alleviate the deferred maintenance burden.**
- **State departments of education and regional educational service agencies should gear up to serve school districts in this critical area.**
- **The link between inefficient energy use, deferred maintenance, and indoor air problems should be widely communicated and become an essential part of the school decision-making process.**
- **Architectural and engineering societies should investigate why school administrators can't use 22 percent of district recommendations auditors make.**

ISSUE 6.

FINANCING SCHOOLS

Long range cost-effectiveness is critical. We must move beyond "first cost," and consider costs over the lifetime of the facility.

Richard Hobbs
American Institute of Architects

THE CHALLENGE

Most school districts continue to experience declining revenues. There are, of course, pockets of affluence or other situations where local conditions prevail to help support the use of local funds. The states, however, suffering from budget shortfalls, are ill-equipped to meet mounting school facility needs.

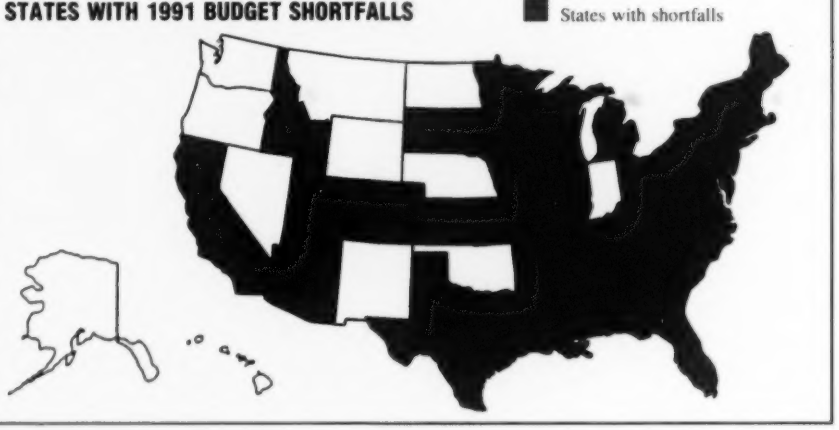
Typical school budget processes constrain the district's flexibility in meeting unexpected expenses, such as lawsuits or escalating energy costs.

BACKGROUND DATA

Public school systems of America rely heavily on support from the states:

- School revenues from the states average 50 percent.
- State support ranges from a low of approximately 7 percent in New Hampshire, to a high of over 91 percent in Hawaii.
- Thirty-seven states operated in a budget shortfall in 1991.
- Of the states' budgets, on average 28 percent goes to education.
- State shortfalls inevitably have a direct and serious impact on school budgets.

FIGURE 6.
STATES WITH 1991 BUDGET SHORTFALLS



Rigid Budgets

In setting their current budgets, public school systems typically rely on:

- previously allocated state appropriations.
- previously assessed property values.
- previously determined authority to tax — usually set by the voters in a millage election.

The schools are not only locked into budgets set many months or even a year or two earlier, but schools also tend to lag behind economic recovery when it starts.

Unlike any other sector of the economy, the public schools have no way to pass through higher utility costs in the price of goods or services. Unexpected costs, such as legal fees or higher utility bills, must be met by cutting educational programs and services.

Growing Demands

To compound the problem, declining school revenues must try to satisfy growing demands, including rising costs, such as:

- school supplies, up 56 percent from the 1983 base year.
- energy, which has jumped $1.2 billion in just the past two years.
- federal and state environmental mandates — which are seldom accompanied by sufficient monies to implement the laws and regulations.
- enrollments, which are climbing and will continue for the foreseeable future. The 1990 birthrate was the highest since 1962.
- needed educational reforms, which further drain school budgets.

RECOMMENDATIONS

- **As state fiscal positions improve, recent cuts in school allocations should be promptly restored.**
- **School facility considerations should be made an integral part of state and local school finance planning.**
- **Federal and state mandates should be accompanied by sufficient monies to implement them.**

ISSUE 7.

INVESTING IN ENERGY EFFICIENCY

The expenditure for energy has a very clear and consistent impact on the operation of the school systems throughout the country. It is part of that vicious downward spiral of poor maintenance and inefficient operation that eventually leads to higher operating costs, principally energy costs. We now appear to be at the point of siphoning off instructional program dollars to pay for past failures to improve facilities. We cannot allow this to continue without very seriously jeopardizing our future.

Frank M. Stewart
Deputy Assistant Secretary for
Technical and Financial Assistance
Department of Energy

Typically, school districts can achieve a 25 percent return on investment (ROI) when they initiate an effective energy program. Since resources are scarce, spending to achieve energy efficiency needs to be seen, not just as another expense, but as an investment that pays dividends.

THE CHALLENGE

While energy efficiency investment represents good business procedures for most districts, other demands on limited resources, particularly those more closely associated with a school district's mission, frequently take precedence.

Since traditional fiscal resources are presently very limited, schools may, in some cases, need to look beyond traditional funding sources to solve problems. Since a lack of funds is the greatest barrier to school energy efficiency effort, private sector financing can help overcome this barrier.

BACKGROUND DATA

When asked to identify past funding sources, as well as anticipated funding sources for the 1991-94 period, there was a significant drop in the schools' reliance on all major funding sources, suggesting a high level of uncertainty as to where schools expect to get energy financing.

For all schools, previous and future reliance on major funding sources are shown in Table 7. The data did reveal two notable exceptions not shown on Table 7: districts in the West expect to increase their dependence on bonds (up 19.8%); and large districts plan to rely more heavily on performance contracting (up 23%).

Financing mechanisms and their current potential to finance energy efficiency in the schools are briefly reviewed on the following pages.

TABLE 7.
RELIANCE ON SOURCES FOR ENERGY FINANCING
Percentage of Districts

FUNDING SOURCES	RELIANCE		PERCENT CHANGE %
	Past % (1987-90)	Future % (1991-94)	
General/operating funds	71.3	42.5	-40.4
Grants; state & federal	50.6	33.1	-34.6
Utility rebates	21.9	13.8	-37.0
Bonds	20.0	13.8	-31.0
Performance contracting	19.4	15.0	-22.7

*Respondents could check more than one; percentages will not add to 100.

Note: The biggest drop in expected reliance on a particular energy financing source was general/operating funds. The smallest drop in expectations was for performance contracting.

Energy Conservation Financing

Most school districts in the nation have five primary sources of energy efficiency financing:

1. General/operating funds, including school aid provided by the state and federal governments.
2. Federal/state grants.
3. Bonds.
4. Utility technical assistance and rebates.
5. Performance contracting.

General/Operating Funds

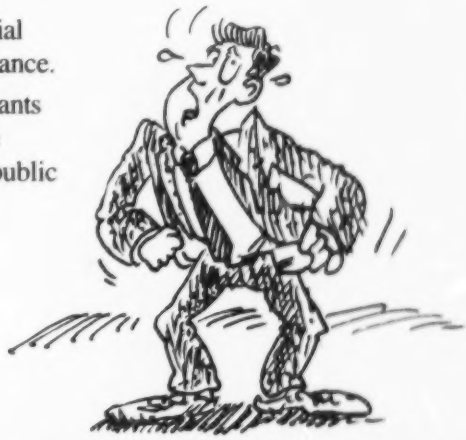
- Approximately 75 percent of the nation's school districts have relied on general operating funds in the past to do energy conservation work. School administrators are wisely curtailing their expectations to use this source in the near future.
- Nearly 50 percent of the districts in the nation are planning to rely on their own funds in the next three years. They are likely to be disappointed, given economic conditions at the state and local levels.

Federal/State Grants

The second place school people have traditionally looked for energy financing has been the federal/state grants programs.

Institutions in the past have been unable to access the federal grants because they lacked the required matching funds. In reauthorizing the federal energy grants program, Institutional Conservation Program (ICP), Congress expressly provided that funds generated through performance contracting could be used for the local match; however, schools may have difficulty complying with the regulations governing this approach. Other problems for schools relying on this source of funds, include:

- In recent years, funds for ICP have largely come from oil overcharge funds (petroleum violation escrow [PVE]), which are dwindling. There is no evidence that Congress will appropriate sufficient money to fully replace these monies.
- States, already awash in red ink and others known to be in financial difficulty, are not in the position to offer much energy grant assistance.
- More than 33 percent of the districts expect to use federal/state grants to fund energy conservation measures in the next three years. The likelihood of federal/state grants serving one-third of the nation's public school districts within the next three years is exceedingly remote.



Bonds

In many states, laws and regulations establish the level of indebtedness that districts may incur. Low expectations on the part of administrators (13.8%) to use bonds as a funding source are probably due to:

- constraints on indebtedness.
- voter reluctance to give schools the authority to use bond financing.
- existing financial pressures.

Utilities

The AASA survey revealed that 22 percent of the districts have received some kind of utility-sponsored assistance, with 30 percent of the large districts and 25 percent of the mid-sized districts receiving this assistance. States with high percentages of districts participating in utility-sponsored programs have been Tennessee, New York, Oklahoma, and California. School administrators' expectations for utility help are dropping (from 22 percent to 14 percent). Large districts are the only group in the study that expect more from utilities in the future.

Special opportunities for schools exist due to:

- **pressures on utilities.** Least cost utility planning, demand-side management, integrated resource management (IRMs), rate reform, and provisions in the Clean Air Act all point to more attention to and support for customer energy efficiency.
- **broader utility financing procedures.** Utilities are turning to other financial resources, particularly performance contracting, to meet their own energy efficiency financing needs. In an arrangement between a utility and an energy service company, the school district could become a "third party" host for energy efficiency improvements to reduce the utility's demand.

To achieve greater energy efficiency and to avoid "cream skimming," school systems need to go beyond lamp replacement. School leaders should seek broader conservation help from utilities, or identify ways to use utility rebates to leverage energy efficiency assistance from other sources.

Performance Contracting

Referring to the shortage of funding, coupled with the expertise schools need to meet energy efficiency needs, Walter Johnston, president of Association of Energy Engineers, has concluded, "Performance contracting is one of the most viable solutions to this problem."

Performance contracting allows school districts to use private sector financing to achieve guaranteed savings. It offers an alternative to the traditional specification and bidding process by concentrating on the performance of the equipment and the private firm. In effect, it enables schools to use predicted future savings to improve/replace equipment and

enhance maintenance and operations now. Its growing popularity is evidenced in the survey findings:

- Performance contracting in schools nearly doubled (from 10 percent to 19.4 percent) since 1988, with 3,000 school districts now using some type of performance contracting.
- Large districts expect a 23 percent increase in their reliance on performance contracting in the next three years.

Local Case Study: Phoenix Union High School District

Typical of the larger districts, Phoenix Union High School District had deferred its maintenance and underfinanced modernizations until the district couldn't stretch its resources any further.

Things came to a head during the 1988–89 school year. Mr. Ken Wissinger, assistant superintendent for business and operations, described the district's plight, "Operating costs were much higher than they should have been because of energy waste and frequent repair of breakdowns. Wear and tear was reflected in deteriorating classroom conditions, too."

With mechanical systems "practically falling apart," a major overhaul was needed before the 1989-90 school year. Finding the financing needed to provide a quality learning environment in all nine high schools and a votech became the challenge.

The district found the answer by entering into a partnership with a private firm that offered financing and energy efficiency expertise. The firm studied the equipment needs, school by school, and proposed a substantial renovation program—all the costs to be covered through energy cost savings over a 10-year period. In the initial phase, five schools were retrofitted. Starting with the last school bell in June, they were ready to go when school started in September—just 100 days later. The firm modernized the heating, ventilating, and air conditioning systems; installed energy management control systems; and instituted a preventive maintenance program to preserve the efficiency gains. Each school received new centrifugal chillers, heating system boilers, and domestic hot water boilers. Thermostats were upgraded and 10,000 energy efficient florescent lamps and ballasts were installed.

In all, the school district received ten centrifugal chillers, eight cooling towers, nine variable frequency drives, five primary secondary loops, thirty modular boilers, six heat exchangers, and a district-wide DDC facilities management control system. Future energy savings paid for all of it.

RECOMMENDATIONS

- **Education associations, state departments of education, state departments of energy, and/or educational service agencies should help school administrators use traditional and non-traditional financing sources more effectively.**
- **School districts should become partners in the EPA's "green lights" lighting efficiency program.**
- **A communications system should be established that allows school administrators to share their experiences in using traditional and non-traditional sources of funding to increase energy efficiency.**
- **Performance contracting should not mean a loss of educational support personnel, but rather a way to redeploy in-house personnel time and abilities to tasks that were previously deferred.**
- **State and federal governments should not only contribute fundamentally to solutions, but should clear the way for non-traditional solutions that might include performance contracting and utility assistance.**

Barriers associated with performance contracting include:

- **school administrators not familiar with the procedures and applicability.** Financing and procurement procedures do not follow the traditional specification/bidding process.
- **unfamiliarity with legality of performance contracting.** Thirty-eight percent of the respondents to the survey indicated they did not know whether performance contracting is permissible under their state laws. (According to the National Association of Energy Service Companies, appropriate contract language can take care of virtually all known performance contracting concerns.)

Several states have passed laws that not only clarify any perceived legal problems, but actually enhance the schools' access to private sector financing. Ohio, Minnesota, and Texas have passed such laws. Other states have pending legislation or strong lobbying efforts for such legislation under way to enact such laws.

Private sector financing should become an increasingly attractive alternative. The benefits already achieved in Ohio schools are presented in the following case study.

A State Case Study: Ohio House Bill 264

The first approved project following the enactment of the law was in April 1986. The benefit of participation is illustrated below as documented through December, 1990.

YEAR	NO. OF DISTRICTS	NO. OF SCHOOLS	TOTAL INVESTED
1986	21	132	$ 23,375,002
1987	25	90	$ 9,764,062
1988	37	193	$ 21,521,387
1989	39	185	$ 28,442,084
1990	45	279	$ 47,771,497
TOTAL	167	879	$131,874,032

Average project cost per school: $150,027
Return on investment through 1990: 126% ROI
Cost avoidance through 1990: **Average $15 million per year**

Experience suggests that most administrators need more information on performance contracting. It has also become evident that those involved in providing school systems outside technical and legal support need a better understanding of the concept.

THE CHALLENGE

School leaders do not have sufficient access to quality facility and energy efficiency information.

Education reform and the quality of our school facilities must be discussed hand-in-hand. Quality instruction cannot take place in an unsafe, unhealthy, or inadequate school facility.

BACKGROUND DATA

At the federal level and in most states, there is a serious leadership void in providing school administrators with facility and energy efficiency guidance:

- The 1989 Education Writers Association's study found that one-third of the 38 states surveyed had one employee or less responsible for facilities in their state departments of education.
- While states usually have some safety, health, space, and size requirements, EWA found that only three states carry out periodic facility inspections.
- An inquiry to the U.S. Department of Education for facility or facility/energy information by the researchers for the AASA 1991 study revealed no office, no person, no timely information (most recent citings were dated 1979).

Absence of Quality Information and Guidance

Illustrative of the misinformation used by administrators to make facility and energy decisions is their perceptions about which measures will save the most energy for the dollars invested. Table 8 indicates the 1991 cost-effectiveness rankings by enrollment and geographical regions, as found in the AASA survey conducted for this report. In the rankings, building envelope is in bold to show its perceived relative cost-effectiveness in each group. Controls, the category ranked most cost-effective in the recent U.S. Department of Energy data (See Table 6), is underscored to facilitate comparisons.

ISSUE 8.

LEADERSHIP AND GUIDANCE: FACILITIES AND ENERGY EFFICIENCY

AASA, in collaborating on this study, is not trying to shift attention away from school reform. Our concerns include a quality learning environment, which is basic to good education. Funds saved through energy conservation can contribute to direct educational services to children; and help us meet our energy needs for America's future. Federal and state guidance to help ensure effective facility and energy decision-making is critically needed.

Rich Miller
Executive Director
American Association of School Administrators

TABLE 8.

RANKED MEASURES FOR PERCEIVED COST-EFFECTIVENESS; BY DISTRICT SIZE AND REGION

Ranking	ENROLLMENTS			REGIONS			
	10,000 or More	1,000 to 9,999	Less Than 1,000	North East	South East	Central	West
1	Controls	Heating	Heating	Elec./Ltg.	Controls	Heating	Heating
2	Heating	**Bldg. Env.**	**Bldg. Env.**	Heating	Heating	**Bldg. Env.**	Elec./Ltg.
3	Elec./Ltg.	Controls	Elec./Ltg.	Controls	Elec./Ltg.	Controls	**Bldg. Env.**
4	Cooling	Elec./Ltg.	Controls	Domestic Hot Water	**Bldg. Env.**	Elec./Ltg.	Controls
5	**Bldg. Env.**	Fuel Conv.	Heat Recov.	Fuel Conver.	Fuel Conver.	Fuel Conver.	Cooling
6			Cooling	**Bldg. Env.**			Ltg. Control
7			Ltg. Control				Fuel Conver.

Building envelope (in bold) is the least cost-effective measure according to U.S. DOE.
Controls (underscored) is ranked by U.S. DOE as the most cost-effective.

As shown in Table 8, the 1991 AASA survey found:

- Administrators are inclined to believe heating modifications are the most cost-effective.
- Building envelope measures rank second — as cost-effective as controls.
- Only administrators from large districts (over 10,000) and those in the Northeast correctly rank building envelope as the least cost-effective measure.

The perceived cost-effectiveness for all respondents reported in the 1991 AASA survey reaffirms results from an earlier U.S. Department of Energy study conducted by the Lawrence Berkeley Laboratories, showing administrators favored building envelope measures as most cost-effective.

While specific needs and conditions can change a measure's cost-effectiveness, it is difficult to conceive of a situation where building envelope work would routinely be the most cost-effective measure. Clearly, most school administrators are not getting the information they need to make wise energy decisions.

Sources of Information

The AASA survey revealed that school administrators across the country have no consistent source of energy efficiency information. Table 9 presents the degree to which certain sources are school administrators' primary source of energy information. The findings reveal that:

- No more than 20 percent of the districts rely on any given source of energy information.
- More districts across the country rely on utility companies and consultants than any other source.
- Professional conferences and/or literature play a key role in keeping school leaders informed.
- Even though 20 percent of the school systems rely on architects and engineers for their energy information, administrators report that approximately 22 percent of their recommendations are never implemented because of factors they neglected to consider.
- Despite the fact that half of the nation's school districts indicate that they have received federal or state grants through the state energy offices, only 17 percent of the administrators look to state energy offices as their primary source of energy information.
- Few administrators consider universities, vendors, or administrators in other districts as primary sources of energy information.

TABLE 9.

SCHOOL ADMINISTRATORS' PRIMARY SOURCE OF ENERGY INFORMATION (By Percentage Responding)

Source	Total Sample (Mean)	DISTRICT ENROLLMENT			REGION OF THE U.S.			
		10,000 or More	1,000 to 9,999	Less Than 1,000	North East	South East	Central	West
Utility Companies	20.3	11.1	17.5	27.3	13.0	24.0	21.3	23.8
Outside Consultants (Architects/Engineers)	20.3	13.6	20.3	18.8	24.1	4.0	24.6	15.9
Professional Conferences and/or Literature	17.7	13.0	17.5	14.1	20.4	28.0	18.0	7.9
State Energy Office	16.9	14.9	17.3	18.0	16.7	16.0	18.9	14.3
Other Staff Members Within District	15.0	36.2	19.4	12.5	16.7	20.0	10.7	20.6
Other	3.4	6.2	2.3	2.3	1.9	4.0	1.6	7.9
Administrators from Other School Districts	3.0	0.9	2.1	3.9	5.6	—	2.5	3.2
Equipment Vendors	1.9	0.9	2.7	1.6	—	—	1.6	4.8
Area Colleges & Universities	—	0.3	—	—	—	—	—	—
No Response	1.5	2.8	0.9	1.6	1.9	4.0	0.8	1.6

If we in this country are going to effectively deal with facility and energy-related issues, we must develop a true team effort at the federal, state, and local levels. This study is a positive step in the implementation of this effort.

Len Nachman
President
National Association of State Directors
of School Plant Services

RECOMMENDATIONS

- **Information from this study, plus the required guidance and training needs revealed by the findings, should be made available to America's school leaders as quickly as possible.**
- **State departments of education should provide school leaders a regular, reliable source of facility information. In addition, an annual national conference should be held focusing on facility needs, opportunities, and new technologies.**

A preponderance of the evidence suggests that reliable facility and energy information and guidance is not reaching most school administrators. This omission appears to be a major impediment in providing America's students safe, healthy, productive learning environments as cost-effectively as possible.

REBUILDING THE FOUNDATION OF OUR SCHOOLS

We cannot measure the loss in human resources to each individual or our nation when children are denied adequate places for learning. We cannot measure the detriment to health and learning when children are subjected to contaminants that pollute classroom air. We cannot judge the risk to nearly 1 million children who today, this minute, are sitting in classrooms in buildings that are structurally unsound.

What will it take to motivate the American people to address these problems? Do we have to wait until the walls crumble and the roofs fall in on our children — and us — before we act? The information in this report shows us what we must do. The time to act is now.

SCHOOL FACILITY EVALUATION FORM

The condition of a school building has a measurable impact on student achievement. We cannot afford to hamper the learning of our nation's youth through inadequate school facilities. The learning environment we offer our students should be a critical concern for every community in America.

This form is designed to help parents and community leaders work with school leaders to evaluate existing school facilities and to set priorities to meet critical needs. Not all items; i.e., food service, are applicable to all buildings; and some unique local features may not be included here. Most of the form can be completed without professional support; however, community leaders are encouraged to engage the support of local architects and/or engineers, especially for those items that are earmarked with an asterisk (*).

SCHOOL FACILITY EVALUATION FORM

School Building Name _____

Address _____

Survey date _____ Team: _____

Year built _____ _____

Additions _____ _____

Overall Building Condition:

Elements	Excellent	Fair	Poor	Recommendations/Comments
Walls ■ interior ■ exterior ■ windows, storm windows ■ insulation				
Ceiling				
Floors				
Structural support*				
Doors ■ interior ■ exterior				

Painting ■ interior ■ exterior				
Electrical system* ■ loads ■ wiring ■ motors ■ fire alarm ■ public address				
Lighting ■ classroom ■ hallways ■ gym/library ■ exterior ■ controls				
Heating/cooling/ventilation* ■ boiler, chiller condition ■ ventilation adequacy ■ mechanical system ■ controls				
Food service facilities				
Plumbing systems				
Restrooms				
Site ■ grounds ■ playground/equipment ■ athletic fields				
Handicapped access				
Indoor air quality concerns ■ evidence of leaks, flooding ■ poor maintenance (mold, fungi, etc.) ■ other sources of pollution				

General maintenance & operation ■ cleanliness ■ equipment/bldg. maint./repairs ■ operations				

Bldg. size & enrollment ratio
(square feet[1] divided by current enrollment;
or stated capacity in relation to current enrollment) _____ sq. ft./student, or _____ (capacity) : : _____ (enrollment)

Energy efficiency[2]
(annual utility bill [cost and/or consumption]
divided by gross square feet) $_____ sq. ft., and/or _____ MMBtu/sq. ft.

1. Gross square feet (GSF) can be found for this building by multiplying the building's exterior length by its width by the number of floors. State GSF requirements or recommendations vary—contact state department of education for minimum GSF/pupil.

2. Energy costs and/or consumption per square foot offers a rough estimate of relative energy efficiency. Contact state energy office, local energy equipment supplier, and/or professional engineer for information on what elementary and secondary schools in your area ought to consume.

Excellent: element/building in superior condition; required work is minimal; environment is conducive to learning

Fair: element/building is adequate; some work is required; environment is adequate but does not enhance learning opportunities

Poor: element/building is inadequate; health and safety of students may be impaired; major adjustments, replacements, renovations are required; learning environment is inadequate

SURVEY DESIGN AND ANALYSIS PROCEDURES

SURVEY INFORMATION

Survey Design

The survey research was designed to obtain: (1) current data on the condition of America's public school facilities; (2) the impact volatile energy prices have had; (3) the energy measures that have been taken; (4) the opportunities that exist to cut operating costs; and (5) the schools' fiscal ability to respond to its facility needs.

Sampling Procedures

Relatively few school districts house about half of the nation's public school enrollment. The majority of our school systems house relatively few students. Recognizing these two conditions, the membership of AASA was stratified by enrollment and sampled disproportionately by strata using systematic sampling with a random start. The strata, the number of districts in a subcategory, the sampling ratio, and the sample drawn are shown in Table 10.

TABLE 10.
SAMPLING INFORMATION

DISTRICT SIZE ENROLLMENT	NUMBER OF DISTRICTS	RATIO	NUMBER SELECTED
) 10,000	600	1:1	660
1,000 TO 9,999	6,565	1:5	1,313
(1,000	8,675	1:15	445
			2,418

A survey instrument was developed to gather the information to meet the research project's objectives. Items were constructed to avoid ambiguities and to facilitate response time. The draft was subjected to careful technical and peer review. The Educational Research Service formatted and coded the questionnaire.

Mailing

AASA mailed the survey in late April 1991. A second wave mailing was sent to the non-respondents in June 1991.

Data Analysis

ERS visually screened the responses to check reasonableness of the answers; i.e., when a respondent gave the district's square footage as 2,400 sq. ft. and reported an annual utility of $300,000, the figures were questioned.

As of August 9, 1991, the survey closing date, 922 useable responses had been received. This number of responses provided a confidence level of 95 percent and a precision level of ±3 percent for the aggregate data.

The data were segregated by the strata for district size. Because geographical location was of interest, the collapsed strata were sorted by four regions of the country: Northeast, Southeast, Central, and West. Respondents were randomly sampled for each geographical region and the data analyzed. Responses to the items were analyzed in aggregate and by categories.

The surveyed element was the school district; however, our area of interest was school facilities. Respondents were asked to give the number of buildings or the percentage of buildings in some instances; thus, enabling some analysis by building.

In order to get an appropriate perspective on the responses as a whole, the strata were collapsed and randomly sampled. The sampled data were analyzed and the findings shown by percentage in the tables under "Total Sample."

RESPONDENT INFORMATION

The percentages of respondents by region are shown in Table 11 for all respondents and for district size. A review of Table 11 will reveal that the Southeast was under-represented in the total sample and the Central states were over-represented, that the large districts were under-represented in the Northeast, and that very few small districts responded in the Southeast.

TABLE 11.
RESPONDENTS FOR THE REGIONS AND BY DISTRICT SIZE

		District Size		
Region	Total Sample (Mean) %	Greater Than 10,000 %	1,000 to 9,999 %	Less Than 1,000 %
Northeast	20.3*	10.5	24.6	13.3
Southeast	9.4	28.5	15.3	3.9
Central	45.9	22.3	42.8	53.1
West	24.6	37.5	16.6	29.7

*Numbers may not equal 100% due to rounding

Position Held By Responding Individual

Superintendents comprised 60.5 percent of the respondents; 19.5 percent were directors of maintenance, physical plant, buildings and grounds; 11.7 were business managers; and 4.1 percent were associate/assistant superintendents. This pattern varied considerably by the size of the district and somewhat by geographical region. The positions held by the respondents are shown in Table 12 by district size and geographical region.

TABLE 12.
DISTRICT POSITIONS HELD BY RESPONDENTS

		DISTRICT ENROLLMENT			REGION OF THE U.S.			
	Total Sample (Mean)	10,000 or More	1,000 to 9,999	Less Than 1,000	North East	South East	Central	West
Superintendent	60.5	5.6	39.2	87.5	37.0	52.0	76.2	54.0
Associate/Assistant Superintendent	4.1	16.1	13.9	—	—	28.0	0.8	4.8
Business Manager, Financial Officer	11.7	7.4	16.9	6.3	33.3	—	6.6	7.9
Director of Maintenance, Physical Plant, Buildings and Grounds	19.5	40.9	25.5	5.5	25.9	20.0	13.1	25.4
Other	3.8	28.5	4.3	0.8	3.7	—	2.5	7.9

Regions Used for Data Analysis

NORTHEAST: CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, RI, VT

SOUTHEAST: AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV

CENTRAL: IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI

WEST: AK, AZ, CA, CO, HI, ID, MT, NV, NM, OK, OR, TX, UT, WA, WY

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GLOSSARY OF ACRONYMS AND TERMS

ACRONYMS

AASA — American Association of School Administrators

A&Es — architects and engineers

DOE — U.S. Department of Energy

EWA — Education Writers Association

HBI — Healthy Building Institute

IAQ — indoor air quality

ICP — Institutional Conservation Program

IRM — integrated resource management

NAESCO — National Association of Energy Service Companies

NIOSH — National Institute of Occupational Safety and Health

PVE — petroleum violation escrow

ROI — return on investment

TERMS

Architects and engineers (A&Es):
Individuals, or the consulting firms they represent

Building envelope:
All external services of a building that are subject to climatic impact; i.e., walls, windows, floor, roof, etc.

Deferred maintenance:
To delay or habitually postpone maintenance work; the growing cost of deferred maintenance.

Environmental mandates:
Any federal, state, or local laws or regulations that require adherence to specific procedures or standards designed to control conditions affecting the environment.

Indoor air quality:
The condition of air in an enclosed space, including temperature, humidity, and the level of pollutants.

Institutional Conservation Program (ICP):
A U.S. Department of Energy grants program administered by state energy offices to help schools modify buildings to reduce energy consumption.

Integrated resource management (IRMs):
Implementation of an integrated resource plan by utilities that incorporates energy efficiency and supply.

National Association of Energy Service Companies (NAESCO):
Members of this association are predominately organizations interested in performance contracting.

Non-instructional requirements:
All costs related to operating a school system; i.e., utility costs, window replacement, etc., that do not directly impact the teaching learning process.

Petroleum violation escrow (PVE):
Funds from oil overcharge penalties.

Ventilation:
The supply of outdoor air and circulation of air within a facility.

SCHOOLHOUSE IN THE RED CONFEREES

The American Association of School Administrators and its Schoolhouse in the Red sponsor, Honeywell, wish to express their appreciation to the following conferees for the time and thought they put into the issues raised in this publication. No expression of unanimity was requested or sought at the conference. While the recommendations presented in this final report represent the general agreement of the participants, no one recommendation should be attributed to any one individual.

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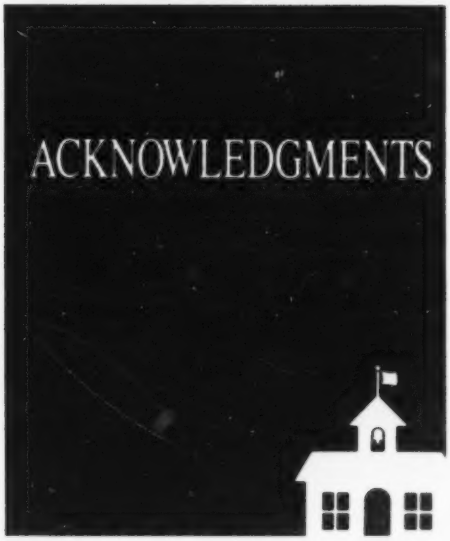

On behalf of the *Schoolhouse in the Red* project's sponsor, Honeywell, and Dr. Shirley Hansen, who directed the project and authored this guide, the American Association of School Administrators would like to express its sincere appreciation to those who responded to our survey, particularly those who also sent case study information. We would also like to acknowledge the fine research support of the Educational Research Service. Particular appreciation goes to the many national leaders in education, energy, and the environment (listed on the inside back cover), who attended our invitational Educational Facilities Conference and made significant contributions to the challenges and recommendations presented in this report.

AASA Senior Associate Executive Director Gary Marx served as the project director, with editorial and production assistance from AASA Associate Editor Leslie Eckard. Graphics were provided by Dahlman/Middour Design.

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